

Chapter 4 Review

- Form a polynomial whose zeros and multiplicity are given:

Zeros: 1 mult=3, -2 mult=2, i ; assume that $a_n=1$

$$y = (x-1)^3(x+2)^2(x-i)(x+i) \Rightarrow (x-1)^3(x+2)^2(x^2+1)$$

- For the polynomial below, list all the zeros and their multiplicities:

$$y = (x-3)^2(x+2)(x^2+1)$$

$$\begin{array}{ll} x=3 \text{ mult. } 2 & x=i \\ x=-2 \text{ mult. } 1 & x=-i \end{array}$$

- Based on the graph given...

- determine the number of turning points and predict the degree of the polynomial.

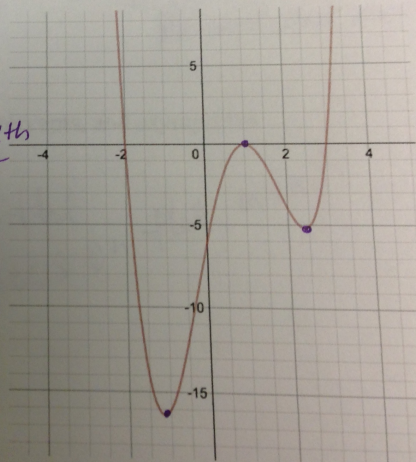
3 turning points \Rightarrow at least 4th degree

- List all the zeros and predict their multiplicity (even or odd)

$x = -2$ mult. odd (crosses x-axis)

$x = 1$ mult. even (bounces off)

$x = 3$ mult. odd (crosses x-axis)



- Use the Intermediate Value Theorem to determine whether the polynomial has

$$\begin{array}{r} x+5 \\ x-2 \overline{) x^2+3x-4} \\ \underline{-x^2-2x} \\ 5x-4 \\ \underline{-5x-10} \\ 6 \end{array}$$

- Use the Intermediate Value Theorem to determine whether the polynomial has a zero on the given interval:

$$y = -5x^3 + 2x + 6; [0, 2]$$

$$f(0) = -5 \cdot 0^3 + 2 \cdot 0 + 6 = 6 > 0$$

$$f(2) = -5(2)^3 + 2 \cdot 2 + 6 = -40 + 4 + 6 = -30 < 0$$

Since one is positive, one is negative

- Use the given zero to predict the rest of the zeros:

$$\text{zero } 1+i; f(x) = x^3 + 6x^2 - 14x + 16$$

$$1-i \text{ - conjugate } \Rightarrow (x-(1+i))(x-(1-i)) \text{ is a factor}$$

$$(x-1-i)(x-1+i) = (x-1)^2 - i^2 = x^2 - 2x + 1 + 1 = x^2 - 2x + 2$$

- Determine the VA, OA, and HA:

$$y = \frac{x^2 + 3x - 4}{x - 2}$$

degree of numerator > degree of denominator \Rightarrow oblique

No HA. OA: $y = x + 5$

- Solve the inequality algebraically:

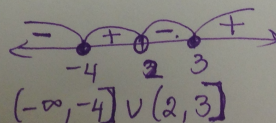
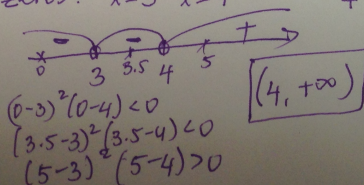
$$\text{a. } (x-3)^2(x-4) > 0$$

$$\text{b. } \frac{(x-3)(x+4)}{x-2} \leq 0$$

Zeros: $x=3$ $x=4$

Zeros: $x=3$ $x=-4$

Undefined: $x=2$



$$\begin{array}{r} x^2-2x+2 \overline{) x^3+6x^2-14x+16} \\ \underline{-x^3-2x^2+2x} \\ 8x^2-16x+16 \\ \underline{-8x^2-16x+16} \\ 0 \end{array}$$

$x+8$ is another factor \Rightarrow

$x = -8$ is a zero.

all the zeros: $1-i, 1+i, -8$